

Adsorption of Fe(II) Solution by Sugarcane Bagasse and Activated Carbon Prepared from Sugarcane Bagasse

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ABSTRACT

Fe(II) contaminant in groundwater is one of the most important in the environmental pollutions as it affects the taste, esthetic quality of the water and turns the color of the water to red-brown. Moreover, when Fe(II) contaminate in large amounts, it is harmful to health. The objective of this study was to evaluate the performance of Fe(II) removal in aqueous solution by the low-cost adsorbents namely, sugarcane bagasse (SB) and activated carbon prepared from sugarcane bagasse (ACSB). The two adsorbents were characterized by BET, FTIR, SEM, and XRF. The adsorption behavior of SB and ACSB for Fe(II) in aqueous solution was investigated as the function of pH (1-5), contact time (5-360 min), initial Fe(II) concentration (50-250 mg/L), and temperature (20-40°C). The adsorption data were analyzed by isotherm and kinetic models. The experimental equilibrium data were best fitted with the Langmuir isotherm model and the maximum monolayer adsorption capacity values were 39.52 and 131.57 mg/g for the SB and the ACSB respectively. The kinetic adsorption data were found to fit well with the pseudo-second-order kinetic and intraparticle diffusion models. Thermodynamic analysis results showed that the adsorption of Fe(II) was spontaneous and endothermic in nature, and was controlled by physical mechanism. In summary, the findings suggested that SB and ACSB were efficient adsorbents, and ACSB showed higher removal of Fe(II) from aqueous solution.

Keywords: Adsorption, Fe(II), Sugarcane bagasse, Activated carbon